brother®

BT-1000 Brother Barcode Font
User's Guide

Version 0

1

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Chapter 1
How to install the BT-1000 Brother Barcode Font Upgrade on Brother Printer

Note: In order to activate the BT-1000, you must use the PCL emulation mode.

1 Windows® Systems
   (Windows® 95/98/Me, Windows NT® 4.0 and Windows® 2000/XP)

To activate the barcode fonts, you must send an activation key to the printer you wish to upgrade. To send the activation key, follow the steps below:

a. You must have already installed the corresponding Windows® printer driver onto the PC you wish to upgrade from. Use the CD-ROM that was supplied with the printer to install a printer driver.

b. Insert the BT-1000 CD-ROM into your CD-ROM drive.

c. Click **AddFont** in the AddFont folder in the CD-ROM.

d. A screen similar to the one below appears:
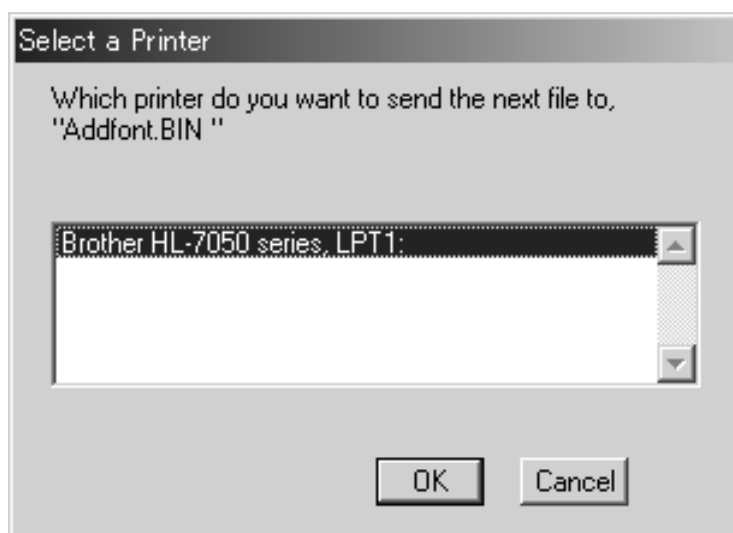
e. Select the appropriate printer. Depending on your printer and PC configuration, the display will vary.

f.   Click the **OK** button to send the font activation key. The printer will receive the activation key. Wait at least 30 seconds.

g.   Switch the printer off and then on.

h.   Print, PRINT FONTS by using the control panel. You can check the newly activated fonts.

2   Other Operating Systems

If you are using another operating system such as Linux, Unix, OS/2, etc, follow the steps below:

a.   Insert the BT-1000 CD-ROM into your CD-ROM drive.

b.   Select the **AddFont.bin** file in the **Others** folder in the CD-ROM and send it to the printer. The printer will receive the activation key. Wait at least 30 seconds.

c.   Switch the printer off and then on.

d.   Print, PRINT FONTS by using the control panel. You can check the newly activated fonts.

Chapter 2
BT-1000 Barcode Font Solutions Manual

1   Code 128

1.1   About Code 128

Introduced in 1981, Code 128 bar codes are used extensively by the shipping industry, as well as for inventory, ID, and tracking purposes. It is often selected over Code 39 when space is at a premium and because it offers a much larger selection of characters. The Code 128 standard is maintained by AIM (Automatic Identification Manufacturers).

Code 128 provides a very dense numeric-only bar code, and a dense alphanumeric bar code. This is a continuous code, of variable length, bi-directional and self-checking. It is designed to encode all 128 ASCII characters, and is optimized to compress the bar code. It will use the least amount of space for data of 6 characters or more of any 1-D symbol.

The character set includes the lower 128 ASCII characters with upper and lowercase letters, numbers, punctuation, and control codes. A check digit, determined by Modulus 103, is placed at the end of the message before the end character, for data integrity purposes. The symbol can be as long as necessary to store the encoded data.

1.2   Choosing the Right Font and Size

BT-1000 includes three different fonts used to create bar code symbols of different densities. Changing fonts alters the width of a bar code without affecting the symbol's height. BT-1000 supports Code set A, Code set B and Code set C.

Like any TrueType or Type 1 font, the bar code fonts can be scaled to any size. Any of the fonts formatted at 24 or 36 points will create bar codes 1/3 (8.5mm) or ½ (12.7mm) inches tall, respectively. Print samples of your desired string in a number of the fonts to verify that it can be scanned when printed on your particular printer.

1.3   PCL Escape Sequences

To print from Unix or DOS systems you must send the appropriate PCL escape sequences to print the bar code font you require. Example escape sequences are shown below:

Code128TT-Regular : esc(12Yesc(s1p#v0s0b28685T
Code128-NarrowTT-Regular : esc(12Yesc(s1p#v0s0b28686T
Code128-WideTT-Regular : esc(12Yesc(s1p#v0s0b28687T
(#: point size 0.25 – 999.75)

Replace the hash (#) with the relevant point size. For example, to print a bar code that is one inch (25.4 mm) high, substitute '#' with '72'. To print a bar code half and inch (12.7 mm) high, use 36.

To switch back to printing normal fonts in the typestyle you expect, print the PCL font list from the printer control panel, and refer to the escape sequence shown on the print out.

1.4   Code 128 Font Product Character Set

ASCII value	Code Set A	Code Set B	Code Set C
174	SP	SP	00
33	!	!	01
34	"	"	02
35	#	#	03
36	$	$	04
37	%	%	05
38	&	&	06
39	'	'	07
40	(	(	08
41	)	)	09
42	*	*	10
43	+	+	11
44	,	,	12
45	-	-	13
46	.	.	14
47	/	/	15
48	0	0	16
49	1	1	17
50	2	2	18
51	3	3	19
52	4	4	20
53	5	5	21
54	6	6	22
55	7	7	23
56	8	8	24
57	9	9	25
58	:	:	26

ASCII value	Code Set A	Code Set B	Code Set C
59	;	;	27
60	<	<	28
61	=	=	29
62	>	>	30
63	?	?	31
64	@	@	32
65	A	A	33
66	B	B	34
67	C	C	35
68	D	D	36
69	E	E	37
70	F	F	38
71	G	G	39
72	H	H	40
73	I	I	41
74	J	J	42
75	K	K	43
76	L	L	44
77	M	M	45
78	N	N	46
79	O	O	47
80	P	P	48
81	Q	Q	49
82	R	R	50
83	S	S	51
84	T	T	52
85	U	U	53
86	V	V	54
87	W	W	55
88	X	X	56
89	Y	Y	57
90	Z	Z	58
91	[	[	59
92	\	\	60
93	]	]	61
94	^	^	62
95	_	_	63
96	NUL	`	64
97	SOH	a	65
98	STX	b	66
99	ETX	c	67
100	EOT	d	68
101	ENQ	e	69
102	ACK	f	70
103	BEL	g	71
104	BS	h	72
105	HT	i	73
106	LF	j	74
107	VT	k	75

ASCII value	Code Set A	Code Set B	Code Set C
108	FF	l	76
109	CR	m	77
110	SOH	n	78
111	SI	o	79
112	DLE	p	80
113	DC1	q	81
114	DC2	r	82
115	DC3	s	83
116	DC4	t	84
117	NAK	u	85
118	SYN	v	86
119	ETB	w	87
120	CAN	x	88
121	EM	y	89
122	SUB	z	90
123	ESC	{	91
124	FS			92
125	GS	}	93
165	RS	~	94
166	US	DEL	95
167	FNC 3	FNC 3	96
168	FNC 2	FNC 2	97
169	SHIFT	SHIFT	98
170	CODE C	CODE C	99
171	CODE B	FNC 4	CODE B (100)
172	FNC 4	CODE A	CODE A (101)
173	FNC 1	FNC 1	FNC 1 (102)
161	START A	START A	START A (103)
162	START B	START B	START B (104)
163	START C	START C	START C (105)
164	STOP	STOP	STOP

2 Code 39

2.1 About Code 39

Code 39 was the first alphanumeric bar code developed and is the most widely used. Also known as Code USD-3 or Code 3/9, Code 39 is widely used in many industries and is the standard for many government bar code specifications, including the U.S. Department of Defense. Code 39 is defined in American National Standards Institute (ANSI) standard MH10.8M-1983.

Code 39 is often used for identification, inventory, and work-in-process tracking because the character set is alphanumeric, the input string length is variable (although more than 25 characters is hard to accommodate), and the symbol itself can vary in height and width. It is bi-directional, includes a checksum option, and is discreet.

BT-1000 includes eight fonts and switching between them changes the bar code's width and density without changing its height.

2.2 What's in it?

Code 39 is an alphanumeric bar code that can be as long as necessary to store encoded data. Designed to encode 26 uppercase letters, 10 digits and 7 special characters, the Code 39 character set includes the digits 0-9, the letters A-Z (upper case only), and the following symbols: space, minus (-), plus (+), full stop (.), dollar sign ($), slash (/), and percent (%). It can be extended to code all 128 ASCII characters by using a two character coding scheme. Extended characters are encoded by a pair of normal Code 39 characters; for example, a lower case 'a' (not part of the standard Code 39 character set) can be encoded by the pair '+A'. A carriage return control code can be encoded by the pair '$M'.

The symbol includes a quiet zone, the start character "*", the encoded data, the stop character "*", and a trailing quiet zone. The asterisk in code 39 is used as the start and stop bar. 5 bars and 4 spaces for a total of 9 elements represent each character. Each bar or space is either "wide" or "narrow" and 3 out of the 9 elements are always wide. That is what gives the code its other name - Code 3 of 9. Of the 9 elements, 3 are large and 6 are narrow. Characters are separated by an inter-character gap the same width as a narrow bar. The ratio of wide: narrow bar width may be in the range of 1.8 to 3.4. Bar codes with a narrow bar width of less than 0.020 inches (0.508mm) should have a ratio of at least 2.5. A ratio of 3.0 is recommended. Every Code 39 bar code should be preceded and followed by a quiet zone the width of at least 10 narrow bars.

2.3 Choosing the Right Font

The various Code 39 fonts creates bar code symbols of different sizes and densities. Most of the fonts use a 2.5:1 wide: narrow bar ratio. The Slim fonts use a 2:1 ratio for narrower symbols and the Wide font uses a 3:1 ratio for wider symbols. Like any TrueType or Type 1 font, the bar code fonts can be scaled to any size. Any of the fonts formatted at 24 or 36 points will create bar codes that are 1/3 (8.5mm) or 1/2 (12.7mm) inches tall respectively.

Be sure to print samples of the desired string in a number of the fonts and check that it can be scanned when printed on your particular printer. Since the fonts have different wide bar to narrow bar ratios, and overall height to width ratios, the same string formatted in different fonts will be different widths. Try different fonts to decide which one works best in your situation.

2.4 The PCL Escape Sequences

From UNIX or DOS it is necessary to send PCL escape sequences as part of the print data to select the desired bar code font. Example escape sequences are shown below:

Code39QuarterInch-Regular : esc(9Yesc(s1p#v0s0b28676T
Code39HalfInch-Regular : esc (9Yesc(s1p#v0s0b28677T
Code39OneInch-Regular : esc(9Yesc(s1p#v0s0b28678T
Code39SmallLow-Regular : esc(9Yesc(s1p#v0s0b28679T
Code39SmallMedium-Regular : esc(9Yesc(s1p#v0s0b28680T
Code39SmallHigh-Regular : esc(9Yesc(s1p#v0s0b28681T
Code39Slim-Regular : esc(9Yesc(s1p#v0s0b28682T
Code39Wide-Regular : esc(9Yesc(s1p#v0s0b28683T
(# : point size 0.25 - 999.75)

Replace the hash (#) with the relevant point size. For example, to print a bar code that is one inch (25.4 mm) high, substitute '#' with '72'. To print a bar code half and inch (12.7 mm) high, use 36.

After printing a bar code it is necessary to select a different font in order to print something besides more bar codes. The PCL command to select the default font is "<esc>(3@". To select a font other than the default font, use the PCL escape sequence show on the PCL font list. The "<esc>" shown is the ASCII escape character. It is decimal 27, hexadecimal 1B, octal 33, or binary 00011011.

2.5 Code 39 Font Product Character Set

ASCII	Character	Code 39
0	NUL	%U
1	SOH	$A
2	STX	$B
3	ETX	$C
4	EOT	$D
5	ENQ	$E
6	ACK	$F
7	BEL	$G
8	BS	$H
9	HT	$I
10	LF	$J
11	VT	$K
12	FF	$L
13	CR	$M
14	SO	$N
15	SI	$O
16	DLE	$P
17	DC1	$Q
18	DC2	$R
19	DC3	$S
20	DC4	$T
21	NAK	$U
22	SYN	$V
23	ETB	$W
24	CAN	$X
25	EM	$Y
26	SUB	$Z
27	ESC	%A
28	FS	%B
29	GS	%C
30	RS	%D
31	US	%E
32	SP	SP
33	!	/A
34	"	/B
35	#	/C
36	$	/D
37	%	/E
38	&	/F
39	'	/G
40	(	/H
41	)	/I
42	*	/J
43	+	/K
44	,	/L
45	-	-

ASCII	Character	Code 39
46	.	.
47	/	/O
48	0	0
49	1	1
50	2	2
51	3	3
52	4	4
53	5	5
54	6	6
55	7	7
56	8	8
57	9	9
58	:	/Z
59	;	%F
60	<	%G
61	=	%H
62	>	%I
63	?	%J
64	@	%V
65	A	A
66	B	B
67	C	C
68	D	D
69	E	E
70	F	F
71	G	G
72	H	H
73	I	I
74	J	J
75	K	K
76	L	L
77	M	M
78	N	N
79	O	O
80	P	P
81	Q	Q
82	R	R
83	S	S
84	T	T
85	U	U
86	V	V
87	W	W
88	X	X
89	Y	Y
90	Z	Z
91	[	%K
92	\	%L
93	]	%M
94	^	%N

ASCII	Character	Code 39
95	_	%O
96	'	%W
97	a	+A
98	b	+B
99	c	+C
100	d	+D
101	e	+E
102	f	+F
103	g	+G
104	h	+H
105	i	+I
106	j	+J
107	k	+K
108	l	+L
109	m	+M
110	n	+N
111	o	+O
112	p	+P
113	q	+Q
114	r	+R
115	s	+S
116	t	+T
117	u	+U
118	v	+V
119	w	+W
120	x	+X
121	y	+Y
122	z	+Z
123	{	%P
124	|	%Q
125	}	%R
126	~	%S
127	DEL	%T, %X, %Y, %Z

3 Interleaved 2 of 5

3.1 About Interleaved 2 of 5

Interleaved 2 of 5 is a numeric-only bar code, variable in length and bi-directional. It is a high-density code that can hold up to 18 digits per inch (25.4mm) when printed using a 7.5 mil X dimension. It is a general-purpose code whose only restriction is that there must be an even number of characters in the data. For general-purpose,

After printing a bar code it is necessary to select a different font in order to print something besides more bar codes. The PCL command to select the default font is "<esc>(3@". To select a font other than the default font, use the PCL escape sequence show on the PCL font list. The "<esc>" shown is the ASCII escape character. It is decimal 27, hexadecimal 1B, octal 33, or binary 00011011.

3.3   I2of5 Font Product Character Set

ASCII	Character	Interleaved 2 of 5
33	!	0
34	"	1
35	#	2
36	$	3
37	%	4
38	&	5
39	'	6
40	(	7
41	)	8
42	*	9
43	+	10
44	,	11
45	-	12
46	.	13
47	/	14
48	0	15
49	1	16
50	2	17
51	3	18
52	4	19
53	5	20
54	6	21
55	7	22
56	8	23
57	9	24
58	:	25
59	;	26
60	<	27
61	=	28
62	>	29
63	?	30
64	@	31
65	A	32
66	B	33
67	C	34
68	D	35
69	E	36
70	F	37
71	G	38
72	H	39

ASCII	Character	Interleaved 2 of 5
73	I	40
74	J	41
75	K	42
76	L	43
77	M	44
78	N	45
79	O	46
80	P	47
81	Q	48
82	R	49
83	S	50
84	T	51
85	U	52
86	V	53
87	W	54
88	X	55
89	Y	56
90	Z	57
91	[	58
92	\	59
93	]	60
94	^	61
95	_	62
96	'	63
97	a	64
98	b	65
99	c	66
100	d	67
101	e	68
102	f	69
103	g	70
104	h	71
105	i	72
106	j	73
107	k	74
108	l	75
109	m	76
110	n	77
111	o	78
112	p	79
113	q	80
114	r	81
115	s	82
116	t	83
117	u	84
118	v	85
119	w	86
120	x	87
121	y	88

ASCII	Character	Interleaved 2 of 5
122	z	89
161		90
162		91
163		92
164		93
165		94
166		95
167		96
168		97
169		98
170		99
171		Start
172		Stop

4 UPC / EAN Code

4.1 About the UPC / EAN Code

UPC Code is a collection of Type 1 and TrueType fonts that create and print UPC version A, UPC version E, EAN-8/JAN-8, EAN-13/JAN-13, Bookland (ISBN), and ISSN bar code symbols within any Microsoft Windows®, Unix or Mac® application. The bar code fonts in UPC Code can be used with your database, spreadsheet, or custom application by simply changing fonts.

Created in 1973, UPC is perhaps the best-known and commonly used 1D bar code. The similar European Article Numbering (EAN) and Japanese Article Numbering (JAN) codes were developed soon after. Extremely reliable codes, (version A of UPC has a 99 percent success rate on the first read pass of a fixed laser scanner) they use the relative distances between leading to leading, and trailing to trailing edges of bars to decode the symbols. It is suitable for a variety of printing techniques and is not prone to errors from ink spreading during printing.

UPC, EAN, Bookland, and ISSN bar codes are found on retail items scanned at the cash register. Package designers therefore create these bar codes. UPC symbols are also placed on shipping labels, forms, and catalogs. Book covers have a Bookland bar code based on the ISBN number. EAN and JAN bar codes are used outside of the US and Canada, while international periodicals use ISSN bar codes.

Generally, the code is split into two halves of six digits each. The first one is always zero, except for products like meat and produce that have variable weight, and a few other special items. The next five are the manufacturers' code, the next five are the product code and the last is a check digit used to verify that the preceding digits have been scanned properly. Cues in the structure of the code tell the scanner which end is which, so it can be scanned in any direction.

Both UPC-A and UPC-E allow for a supplemental two or five digit number to be appended to the main bar code symbol. The supplemental message was designed for use on publications and periodicals. To enter a supplemental message, it must consist of either two or five numeric digits. The supplemental is simply a small additional bar code that is added onto the right side of a standard UPC symbol.

4.2 Types of UPC Symbols

4.2.1 UPC-A

UPC-A is a 12 digit, numeric symbology used in retail applications to identify the manufacturer and specific product so point-of- sale cash register systems can automatically look up the price. UPC-A symbols consist of 11 data digits, and one check digit. The first digit is a number system digit that usually represents the type of product being identified.

The next 5 digits are the manufacturers' code, followed by a 5-digit product code. UPC-A encodes 12 numeric digits. The first digit identifies the numbering system:
> 0: regular UPC codes
> 1: reserved
> 2: random weight items marked at the store
> 3: National Drug Code and National Health Related Items code
> 4: no format restrictions, for in-store use on non-food items
> 5: for use on coupons
> 6: reserved
> 7: regular UPC codes
> 8: reserved
> 9: reserved

The next group of 5 digits identifies the manufacturer and is assigned by The Uniform Code Council (UCC). The next 5 digits identify the particular product and are assigned by the manufacturer. The last digit is a Modulo 10 checksum.

The checksum is a Modulo 10 calculation.
1. Add the values of the digits in positions 1, 3, 5, 7, 9, and 11.
2. Multiply this result by 3.
3. Add the values of the digits in positions 2, 4, 6, 8, and 10.
4. Sum the results of steps 2 and 3.
5. The check character is the smallest number which, when added to the result in step 4, produces a multiple of 10.

A UPC-A code may be augmented with the two-digit supplemental bar code noted above to indicate the issue number for a periodical. Weekly publications are generally numbered 1-52, while semi-monthlies are numbered 1-24 and monthlies 1-12.

4.2.2   UPC-E

The UPC-E code is a compressed bar code intended for use on small items. Compression works by squeezing extra zeros out of the bar code and then automatically re-inserting them at the scanner. Only bar codes containing zeros are candidates for the UPC-E symbol.

UPC-E is also referred to as "zero suppressed". The way this works is that UPC-E compresses a normal 12-digit UPC-A code into a six-digit code by "suppressing" the number system digit, trailing zeros in the manufacturers code and leading zeros in the product identification part of the bar. By suppressing zeros, UPC-E codes can be printed in a very small space required for labeling small items. The UPC-E code can only be used if the system character is 0 and the original 10 data characters have at least four zeros.

For example, the UPC-A code 12300-00064 can be compressed to 123643. The last digit (3) indicates the type of compression. Guard bars precede and follow the data in the pattern. The UPC-E bar code specifies left hand guard bars, the six data characters, and right hand guard bars.

In addition to the requirement that the first digit of the bar code (number system) must be zero, there are four rules that determine what UPC codes can be printed using the compressed UPC-E format:

*If the last 3 digits of the manufacturer's number are 000, 100, or 200, the valid product code numbers are 00000 - 00999 (1,000 numbers)
*If the last 3 digits of the manufacturer's number are 300, 400, 500, 600, 700, 800, or 900, the valid product code numbers are 00000 – 00099 (100 numbers)
*If the last 2 digits in the manufacturer's number are 10, 20, 30, 40, 50, 60, 70, 80, or 90, the valid product code numbers are 00000 – 00009 (10 numbers)
*If the manufacturer's number does not end in zero, the valid product code numbers are 00005 - 00009 (5 numbers)

The checksum for the UPC-E code is calculated with the same method as the UPC-A code.

4.3   PCL Escape Sequences

From UNIX or DOS it is necessary to send PCL escape sequences as part of the print data to select the desired bar code font. The PCL escape sequences for the fonts are shown on the PCL font list. Instructions on how to print the PCL font list are given in your printer manual.

Font Name   PCL Escape Sequence
UPCTall : esc(24Yesc(s1p#v0s0b28688T
UPCTallNarrow : esc(24Yesc(s1p#v0s0b28689T
UPCTallThin : esc(24Yesc(s1p#v0s0b28690T
UPCHalf : esc(24Yesc(s1p#v0s0b28691T
UPCHalfNarrow : esc(24Yesc(s1p#v0s0b28692T
UPCHalfThin : esc(24Yesc(s1p#v0s0b28693T
UPCTallMusicThin : esc(24Yesc(s1p#v0s0b28694T
UPCHalfMusicThin : esc(24Yesc(s1p#v0s0b28695T
UPCTallBarsThin : esc(24Yesc(s1p#v0s0b28696T
UPCHalfBarsThin : esc(24Yesc(s1p#v0s0b28697T
(# : point size 0.25 - 999.75)

After printing a bar code it is necessary to select a different font in order to print something besides more bar codes. The PCL command to select the default font is "<esc>(3@". To select a font other than the default font, use the PCL escape sequence shown on the PCL font list.

5   Codabar

5.1   About Codabar

Created in 1972, Codabar was developed by the Monarch Marking Systems division of Pitney Bowes, Inc. Originally developed for retail price labeling, Codabar is a general purpose bar code used primarily for numeric data. It is used in libraries, to label photo-finishing envelopes, Federal Express air bills, and is the American Blood Commission's standard symbology for blood bag labeling. Blood banks use the D stop character to indicate that the next bar code beginning with a D should be concatenated with the current bar code. The Xerox Codabar bar code font is the Rationalized Codabar variant. Codabar may also be referred to as Ames Code, USD-4, NW-7, or 2 of 7 Code.

Codabar is bi-directional, self-checked and discrete. Its length is unlimited and there is no checksum defined as part of the Codabar standard, but some industries (libraries, for example) have adopted their own checksum standards. AIM has a recommended check character.

The Codabar font works with any Microsoft Windows[®], Macintosh[®], or UNIX application. As a font, it is easy to integrate into a database, spreadsheet, or custom application.

Codabar is unusual because some characters are wider than others. With 2-element widths defined, each character contains 4 bars and 3 spaces. The character is followed by a single narrow space to separate it from the next character. Each pattern begins and ends with one of 4 start/stop characters A-D.

Codabar defines different element widths for each of the characters in an effort to make all the characters have the same width. (Rationalized Codabar uses the same patterns, but assigns only 2 element widths for wide and narrow.)

5.2   PCL Escape Sequences

From UNIX or DOS it is necessary to send PCL escape sequences as part of the print data to select the desired bar code font. The PCL escape sequences for the fonts are shown on the PCL font list. Instructions on how to print the PCL font list are given in your printer manual.

Font Name   PCL Escape Sequence
Codabar-Regular : esc(26Yesc(s1p#v0s0b28702T
(# : point size 0.25 - 999.75)

Replace the hash (#) with the relevant point size. For example, to print a bar code that is one inch (25.4 mm) high, substitute '#' with '72'. To print a bar code half and inch (12.7 mm) high, use 36.

After printing a bar code it is necessary to select a different font in order to print something besides more bar codes. The PCL command to select the default font is "<esc>(3@". To select a font other than the default font, use the PCL escape sequence show on the PCL font list. The "<esc>" shown is the ASCII escape character. It is decimal 27, hexadecimal 1B, octal 33, or binary 00011011.